Diagnosing Asthma

Asthma in Infants and Children < age 5

Several studies show that as many as 50 to 80 percent of children with asthma develop symptoms before their fifth birthday. Despite this, asthma is frequently incorrectly diagnosed in infants and young children, resulting in improper treatment. Signs and symptoms of asthma are not the same for everyone, and they may be mistaken for signs of other common childhood illnesses.

Not all wheezing is asthma, however:

- Frequent coughing, with or without wheezing, is almost always caused by asthma.
- Coughing may be the child's only symptom of asthma. Wheezing may or may not be present.

No single finding will indicate that the child has asthma, but using the following protocol can make the diagnosis more accurate.

To establish an asthma diagnosis in an infant or child < age 5, determine the following:

1. Take a complete medical history of the child, including:

- History of any of the following: cough (worse particularly at night), recurrent wheeze, recurrent difficult breathing, recurrent chest tightness.
- Symptoms occur or worsen in the presence of:
  1. Exercise
  2. Viral infection
  3. Animals with fur
  4. Domestic dust mites (in pillows, upholstered furniture, carpets)
  5. Smoke (tobacco, wood)
  6. Pollen
  7. Changes in temperature
  8. Strong emotional expression (laughing or crying hard)
  9. Aerosol chemicals
  10. Drugs (aspirin, beta blockers)
- **Severity (absences from school, extra doctor visits, ED visits/hospitalizations, activity limitations)**
- **Characteristics of the child's home**
- **Development of disease and current treatment:**
  1. Age of onset and diagnosis
  2. History of early-life injury to airways (e.g. prematurity, respiratory infections, parental smoking)
  3. Comorbid conditions (e.g. rhinitis, sinusitis, gastroesophageal reflux, hay fever)
  4. Family history of allergies and asthma
  5. Progress of the disease (better or worse)
  6. Profile of typical exacerbation
  7. Present management and response, including plans for managing exacerbations, need for oral corticosteroids (and frequency of use)
- **Impact of asthma on child and family**
  1. Episodes of unscheduled care
  2. Life-threatening exacerbations
  3. Absences from/interruptions of school or other activities
  4. Activity limitations, especially physical activities
  5. History of nighttime awakening with symptoms
  6. Effect on growth, development, behavior & school performance, impact on family routines/dynamics/economics
  7. Daycare/school characteristics that may interfere with adherence to treatment
- **The child's and family's perceptions of disease**
  1. Child and parent perception and belief about asthma and medications to treat asthma
  2. Ability of child and parents to cope with disease, and to recognize the severity of an attack

2. Do a complete physical exam, looking for:

- Wheezing, which may or may not be present with asthma
- Signs that the child has trouble breathing, including hyperexpansion of the thorax, use of accessory muscles, tachypnea
- Signs of other allergic diseases,including atopic dermatitis/eczema, clear nasal discharge, swelling of and/or pale nasal mucosa

3. Objective measurements, if possible. Consider asthma if any of the above indicators is present, then confirm with spirometry. If the child is too young for spirometry to be done, diagnosis should be made based on the medical history, physical exam and/or response to asthma treatment. Children with asthma may need additional tests to aid and/or confirm the diagnosis.

- **Referral to a specialist is recommended for consultation or co-management**
- **Bronchoprovocation with cold air, methacholine, or exercise**
- **Child has symptoms (coughing, wheezing, breathlessness, chest tightness), but spirometry is (near) normal**
- **Assess diurnal variation of PEF over 1-2 weeks (>20% variability is indicative of asthma)**
  1. PEF varies more than 20 percent from morning measurement upon arising to measurement 12 hours later
- **Diagnostic challenges include the following:**
  1. Many infants and children who wheeze with viral respiratory infections may not develop asthma that persists through childhood. But they may benefit from asthma medications for their wheezing episodes. There is no certain way to predict which children will have persistent asthma, but allergy, a family history of allergy or asthma, and perinatal exposure to passive smoke and allergens are more strongly associated with continuing asthma.
  2. Asthma should be considered if the patient's colds repeatedly "go to the chest" or take more than 10 days to clear up, or if the patient improves when asthma medications given.

Adapted from the Guidelines for the Diagnosis and Management of Asthma, National Asthma Education and Prevention Program, National Institutes of Health, 1997.

Diagnosing Asthma

Asthma in Adults & Children >5 Years of Age

Recurrent episodes of coughing or wheezing are almost always due to asthma in both children and adults. Cough can be the sole symptom. The following protocol may help you positively diagnose asthma.

To establish an asthma diagnosis in adults & children > age 5, determine the following:

1. Obtain a complete medical history, including history or presence of episodic symptoms of airflow obstruction (i.e. wheeze, shortness of breath, tightness in the chest, or cough). Find out about:

- Asthma symptoms that vary throughout the day. Absence of symptoms at the time of the examination does not exclude the diagnosis of asthma.
- Symptoms worsen in the presence of allergens in the air, irritants, or exercise
- Symptoms occur or worsen at night, awakening the patient
- Allergic rhinitis or atopic dermatitis
- Close relatives who have asthma, allergy sinusitis, or rhinitis
- Consider school or work exposures that may contribute to the development of asthma

2. Physical examination of the upper respiratory tract, chest and skin:

- Hyperexpansion of the thorax
- Sounds of wheezing during normal breathing or a prolonged phase of forced exhalation; absence of symptoms at the time of the examination does not exclude the diagnosis of asthma.
- Increased nasal secretions, mucosal swelling, sinusitis, rhinitis, or nasal polyps
- Atopic dermatitis/eczema or other signs of allergic skin problems

3. Airflow obstruction is at least partially reversible. Use spirometry to:

- Establish airflow obstruction: FEV1< 80 percent predicted; FEV1/FVC <65 percent or below the lower limit of normal. If obstruction is absent, additional tests may be needed.
- Establish reversibility: FEV1 increases 12 percent and at least 200 mL after using a short-acting inhaled beta$_2$-agonist.
- Older adults may need to take oral steroids for 2 to 3 weeks and then take the spirometry test to measure the degree of reversibility achieved.

4. Alternative diagnoses are excluded (i.e. vocal cord dysfunction, vascular rings, foreign bodies, or other pulmonary diseases). Additional tests, such as a chest X-ray or allergy tests may be needed to exclude other diagnoses.

Adapted from the Guidelines for the Diagnosis and Management of Asthma, National Asthma Education and Prevention Program, National Institutes of Health, 1997.

Asthma in Older Adults

The differential diagnosis of episodic chest symptoms in the elderly expands as cardiovascular disease and other forms of chronic lung disease become more prevalent. It is important not to misdiagnose asthma as chronic obstructive pulmonary disease (COPD) because asthma has a different natural history and a better prognosis with treatment.

To establish an asthma diagnosis in older adults, determine the following:

- Perform an asthma-specific medical history and physical exam.
- Be sure to review all medications the patient is taking. Beta blockers are known to induce bronchospasm as a side effect.
- Document by spirometry that airflow obstruction exists and is partially reversible, for example:
- FEV1 is <80% of the predicted limit
- FEV1/FVC is ≤75% the lower limit of normal (this ratio decreases as people age)
- FEV1 increases >12% and at least 200mL after use of a short-acting inhaled beta$_2$-agonist (i.e. albuterol)

- Chronic bronchitis and emphysema may coexist with asthma in adults. Older adults may need to use oral steroids for 2-3 weeks before taking the spirometry test to measure the degree of reversibility achieved.
- Normal spirometry does not exclude the diagnosis of asthma.

Adapted from Considerations for Diagnosing and Managing Asthma in the Elderly, publication no. 96-3662 from the National Institutes of Health, February 1996, National Heart, Lung, and Blood Institute.

Diagnosing Asthma

Work-Related Asthma

There are hundreds of known causes of work-related asthma. Each year in Michigan, about 150 new cases of asthma caused by exposures to substances at work are reported to the Michigan Department of Consumer and Industry Services (MDCIS). Inspections at the companies where these people work find large numbers of fellow workers with asthma or breathing symptoms like asthma. The work exposures may exacerbate a person's existing asthma, or cause new asthma either from becoming allergic to a workplace substance or from exposure to a high level of an irritant chemical.

Workers who are exposed to inhalant chemicals or allergens in the workplace can develop asthma and may be misdiagnosed as having chronic bronchitis pulmonary disease. Early recognition (PEF measurements at work and home), strict avoidance of further exposure, and early treatment are essential. PEF variability of >20% between work and non-work suggests occupational asthma.

When to suspect a person's asthma is work-related:

- If asthma symptoms are worse at work
- If asthma symptoms are better or improve away from work
- If a worker develops asthma after beginning a new job
- New onset asthma in an adult
- Pre-existing asthma that worsens in an adult's life

Medical Screening

The purpose of an annual medical screening is to identify symptomatic individuals and remove them from exposure in order to reduce the likelihood of causing a chronic disability. The following is the accepted protocol used to screen for work-related asthma.

Screening Protocol

1. **Questionnaire:** A questionnaire should be administered during a pre-placement physical to obtain a baseline, and on an annual basis. Since the symptoms from occupational allergens can be intermittent, particularly when they first begin, the person may have a completely normal physical examination and breathing test and still be having severe attacks of asthma. To find key questions that should be included at an initial and annual examination, visit the Michigan State University Occupational and Environmental Medicine website at: **http://web2.chm.msu.edu/oem/index.htm** and click on *Recommended Medical Screening Protocol for Workers Exposed to Occupational Allergens*.

2. **Physical Examination:** A physical examination with particular attention to the skin, head, eyes, ears, nose, throat, and lungs should be performed pre-placement as a baseline and on an annual basis.

3. **Pulmonary Function Testing:** Pulmonary function testing should be done as a baseline and annually. All pulmonary function testing should use equipment and follow the protocol of the American Thoracic Society. The technician administering the test should have completed an accredited training course such as one approved by the National Institute for Occupational Safety and Health.

Individuals who are suspected to have occupational asthma should have the diagnosis confirmed by pre and post shift or mid shift (depending when the individual becomes symptomatic) pulmonary function testing or measurement of peak flow every two hours over a two-week period with a portable peak flow meter. Sufficient time off work (two weeks or more) may be necessary to allow recovery and documentation by peak flow measurements. All individuals should be strongly advised to stop smoking. For exposures to some substances, smokers with similar levels of exposure as nonsmokers will develop work-related asthma at higher rates and in a shorter period of time than non-smokers.

Compiled from materials provided by the Michigan State University Occupational and Environmental Medicine Department.